

## Description

Accelerated establishment of a connection between a number of mobile radio users

The invention relates to methods and devices for establishing a connection between a mobile radio user initiating establishment of the connection and a further mobile radio user or further mobile radio users from a group of mobile radio users.

The invention relates to services, for which connections have to be established as quickly as possible, for example a so-called push to talk service for a mobile radio network, in which a mobile radio user can initiate a connection to predefined (and also currently available) members of a group of mobile radio users (and in some instances also fixed-network users) by means of an input, for example pushing a button, at their mobile station.

Such connections can be established in different mobile radio networks, such as GSM/CDMA/TDMA/WCDMA/TDCCMA/TDCSMA/4G mobile radio networks. Members of a group can also be mobile radio users, who communicate via different mobile radio networks and radio interfaces with the other members of the group.

To establish such a connection, a channel used for the transmission of signaling data can be established in the form of a PDP context between a member of the group and a mobile radio network for the transmission of signaling data and a voice channel in the form of a further PDP context can be established for the transmission of voice data between the mobile radio terminal and a mobile radio network. Signaling

for session control purposes (including connection establishment and processing) can take place via the PDP context provided for signaling. The voice channel in the form of a further PDP context can transmit voice data between at least one mobile radio user and a mobile radio network (for forwarding to the other mobile radio users of a group) respectively. The PDP context to be provided for transmitting voice data can be of better quality (in respect of delay and/or loss rate).

US 2002/0181423 A1 describes a device and a system for channel management and overhead functions, which are associated with the use of specific channels for point-to-multipoint services in a cellular communication system. This allows point-to-multipoint and point-to-point communication services in an existing cellular communication system.

The object of the present invention is to allow uninterrupted establishment of a connection between a mobile radio user and members of a group in the simplest and most efficient manner possible via at least one mobile radio network further to an input by a mobile radio user in the group (in particular push to talk). The object is achieved by the subject matter of the independent claims respectively.

Since according to the invention voice data is transmitted between a mobile radio user and a mobile radio network first via a useful data channel also used for the transmission of signaling data (first PDP context), until a further useful channel (second PDP context) is established between this user and the mobile radio network, whereupon voice data is transmitted via the second useful channel, the transmission of voice data can be accelerated in a simple and efficient manner

during the establishment of a connection between the mobile radio user and the mobile radio network for a push to talk service, as the user can first talk via the (already established) useful data channel used for the transmission of signaling data, so that delays are avoided before establishment of the voice channel (which can be more complex, in particular if negotiations are required in respect of resources and/or codecs).

In some mobile radio networks such a method could be implemented just by means of a modification in the mobile radio terminal of a user, which transmits useful data (e.g. voice data, streaming video data or data for interactive applications) first via a first channel used for the transmission of signaling data (first PDP context) and, when a second channel (second PDP context) has been established, transmits the useful data via the second channel (optionally informing the mobile radio network and/or receiving mobile radio terminals of this). If a mobile radio terminal, which can according to the invention for example transmit voice data first via a first channel used for the transmission of signaling data, calls a member of a group, whose mobile radio terminal cannot do this, the mobile radio network can send voice data to be transmitted to the further mobile radio terminal (which can only receive voice data via a voice channel) via a PDP context provided (only) for voice transmission.

Further features and advantages of the invention will emerge from the claims and description which follows of an exemplary embodiment with reference to the drawing, in which:

Figure 1 shows the claimed establishment of a connection between a mobile radio terminal and a mobile radio network and Figure 2 shows a schematic illustration of a specific example of the parties involved in a push to talk connection.

Figure 1 shows a mobile radio terminal (UE-A) of a mobile radio user wishing to establish a connection between themselves (1) and further members 18, 19 of a group 1, 18, 19 of mobile radio users by means of a push to talk service (by means of an input such as pushing a button) and (at least) one switching arrangement in the form of a GGSN (2) of a mobile radio network (and control arrangements P-CSCF (3), S-CSCF (4) of a mobile radio network and a POC server) via useful data channels in PDP contexts (5, 10).

The mobile radio users (i.e. the mobile radio user identities in a mobile radio user identity card SIM, etc. or mobile radio terminals) that are members of a group can be stored in a mobile radio terminal (and can also be notified to at least one mobile radio network in the course of a connection) and/or stored in a mobile radio network. After an input, for example pushing a button, at a mobile radio terminal of a mobile user a connection can be established to the members of this group.

A first PDP context (5) is first activated between the mobile radio terminal (UE-A1) and a switching center (GGSN2) and SIP-based registration (6) takes place between the mobile radio terminal and a control arrangement S-CSCF (4) of a mobile radio network. After a mobile radio terminal UE-A (1) of a mobile radio user detects an input in respect of the requested establishment of a connection to one or more members of a group (e.g. a specific key is pushed for a push to talk service), it 1 sends a message (7) via a signaling channel

(which does not have to correspond to the first PDP context) to a POC server (5) controlling the establishment of a connection between the users in a group (e.g. with a message "SIP invited (SIP\_A)").

The POC server 5 responds with a confirmation (8) (message "2.200 ok for invite") to the mobile radio terminal 1. (At least) one more PDP context (10) than the one provided for the transmission of useful data is also established between a mobile radio terminal UE-A 1 and a switching arrangement (GGSN) (2) of a mobile radio network. This useful data can include voice, video or other data. However establishment of this second PDP context (10) takes longer than the immediate use of the already existing first PDP context (and/or is even not established until after the first PDP context), so that the second PDP context for the useful data is available later than the PDP context for the signaling data. Voice data for example is therefore first transmitted via the first channel used for the transmission of signaling data from a mobile radio terminal (1) (in the known manner via an air interface and base stations, etc.) to a switching arrangement (2) of a mobile radio network, until the second PDP context provided for the transmission of voice data has also been established.

Figure 2 shows a schematic illustration of data transmission during a group call.

The useful data is transmitted respectively between the mobile radio terminals (1) (with mobile radio user identity cards SIM, etc.) via an air interface (11) of a mobile radio network, base stations, etc. (12), switching arrangements (GGSN 2), further switching arrangements (in this instance GGSNs 13, 14), further base stations etc. (15, 26) and air interfaces (16, 17) to further mobile radio users (mobile

radio stations 18, 19) of a group (1, 18, 19). Transmission between the switching arrangements (2, 13, 14) can take place directly, via GGSNs, SGSNs or group call switching systems (5). In the same way as voice data from the mobile station (1) of a user (as described above) is first transmitted via a more quickly established first PDP context (20) provided for signaling and then via a second PDP context (21) established later or more slowly but in some instances providing better quality, it is also possible for further members (18, 19) of a group of mobile radio users after the connection has been established for useful data (=useful data of a user) to be transmitted first via a more quickly established first useful data channel (first PDP context 23 or 25) and then, after a second (useful data) channel has been established for useful data (second PDP context 23 or 24), to be transmitted via a second channel 22, 24. In this manner a first useful data transmission will take place soon after activation even for the users MS-B, MS-C (18, 19) of the group after activation of a connection establishment (by users MS-A (1) = UE-A (1)).